A Novel Composite Obtained Through of Chemical Interaction of Zirconium (IV) Phosphated with Silver Hexacyanoferrate (III) for Voltammetric Detection of L-cysteine

Tayla Fernanda S. Da Silveira, Daniela S. Fernandes, Mariana de Souza Magossi, Priscila Fernanda P. Barbosa, Tamires R. Souza, Maiara de Souza Magossi, Devaney R. Do Carmo*

Faculdade de Engenharia de Ilha Solteira, Universidade Estadual Paulista “Júlio de Mesquita Filho”, Departamento de Física e Química, Av. Brasil Centro, 56, Ilha Solteira-SP, Brasil. CEP. 15.385-000.

*E-mail: docarmo@dfq.feis.unesp.br

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A novel composite obtained from reaction of zirconium (IV) phosphated (ZrP) with Ag^+ and subsequent interaction of potassium hexacyanoferrate (III) (ZrPAgH) was prepared and characterized by infrared spectroscopy (FTIR) and cyclic voltammetry. The graphite paste electrode modified with ZrPAgH exhibited a cyclic voltammogram with a redox couple with midpoint potential $E^0 = 0.70 \text{ V}$ (vs $\text{Ag}/\text{AgCl}_{(\text{sat.})}$), attributed to the $\text{Ag}^{\text{I}}\text{-CN-Fe}^{\text{II}}/\text{Ag}^{\text{I}}\text{-CN-Fe}^{\text{III}}$ process (40% w/w; KNO_3 1.0 mol L^{-1} ; $\nu = 20 \text{ mV s}^{-1}$). The graphite paste electrode modified with ZrPAgH can be used in the electrocatalytic oxidation of L-cysteine in a linear range from $1.0 \times 10^{-5} \text{ mol L}^{-1}$ to $8.0 \times 10^{-5} \text{ mol L}^{-1}$ ($R = 0.995$) with detection limit of $1.02 \times 10^{-5} \text{ mol L}^{-1}$ and amperometric sensitivity of $2.40 \text{ mA/mol L}^{-1}$.

Keywords: Cyclic Voltammetry; Graphite Paste; L-cysteine; Silver Hexacyanoferrate (III); Zirconium Phosphated.

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